

## Chairman's Address.

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To the Perth Division of The Institution, at Perth, 5/4/1937.

It is customary for the Chairman's Address in the Perth Division of The Institution to embrace some subject with which the Chairman has had specialised experience. I have therefore taken as my subject: *The North-West of Western Australia*, the puzzle of its settlement, some recent developments and some possible solutions of its problems. See Fig. 1.

It was my privilege to read a paper at the Engineering Conference of The Institution of 1927, ten years ago, which was held in Perth. I then chose as my subject: *The Application of Engineering to the Development of the North-West of Western Australia*.

I expressed the opinions (a) That the development of the pastoral industry in the form of sheep and wool-growing would give the best results, with the possible exception of a

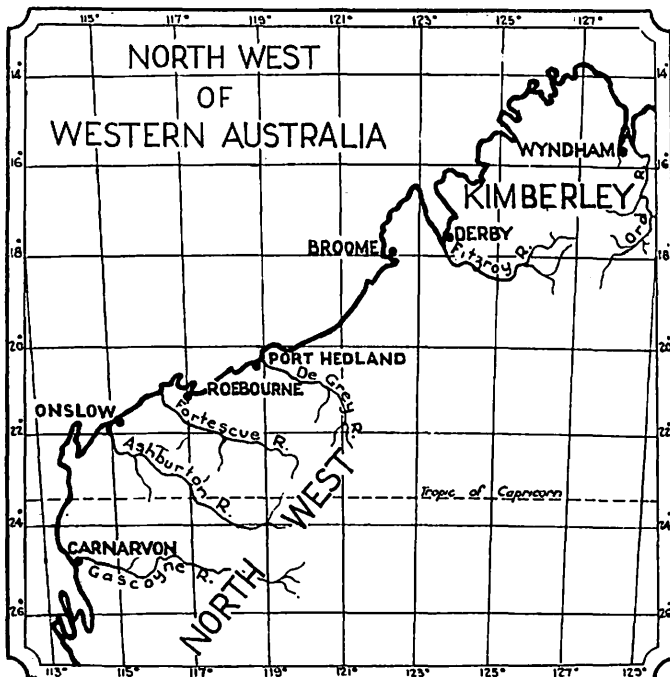


Fig. 1.

sudden increased mining activity; and (b) That each of the main river basins, Gascoyne, Ashburton, Fortescue, De Grey, Fitzroy and Ord, should be considered separately. I also expressed the opinion that after five years of experiment and investigation it should be possible to determine the formulae for development of each of those river basins.

I then conjectured that the results of such research would prove:—

(1) That irrigation is an essential aid to any further marked increase in population and production;

(2) That enough water flows to waste in good seasons to make possible the conservation of a sufficient supply to meet requirements of all years;

(3) That sites for such conservation are available;

(4) That in some rivers underground water will be obtainable in sufficient quantity for irrigation;

(5) That holdings of 50,000 acres on the better lands and 200,000 on the poorer, will be about the economic size for pastoral pursuits;

(6) That the carrying capacity of sheep and cattle lands can be at least doubled;

(7) That, with smaller holdings and the use of irrigation, the population and production can be so increased that the construction of railways within the main basins will be justified;

(8) That Kimberley rivers can be trained so as to release the rich alluvial plains for cultivation and grazing throughout the year;

(9) That many of the northern cattle-stations can be profitably converted into smaller sheep-stations;

(10) That the cattle herds can be increased so as to supply the Wyndham Meatworks with first-grade beasts;

(11) That, with a better steamship service to Wyndham and the construction of a railway through the Ord Valley, large areas in this River Basin can be closely settled, pig-farming and the production of profitable tropical crops being the basis of settlement;

(12) That the De Grey-Oakover River basin is capable of supporting a large mining population.

Although these conjectures were made 10 years ago, we can, unfortunately, do little more than conjecture still. Practically nothing has been done in the way of experiment or investigation—but from the little that has been undertaken, definite results have followed. This aspect I shall deal with later.

Now, after 10 more years of experience of the North-West, I am prepared to modify some of my earlier conjectures. For instance, the size of pastoral holdings then quoted for economic working might be increased by at least 50%—road-trains might be substituted for railways in all river basins, other than the Ord. The road-train has, of course, been very considerably developed since 1927.

The one definite and successful experiment is at Carnarvon. There it has been proved that underground water is available in at least one of the North-West sandy river-beds. It has also been proved that good livings can be made from growing bananas (by irrigation from the river-bed sands), with tomatoes, paw-paws and pineapples as side lines. A large part of Perth's banana requirements is supplied from Carnarvon.

Already along the banks of the Gascoyne there are some 50 plantations in bearing. They are dependent on irrigation water from the apparently dry water-course; each planter has his own pumping plant and sump in the river-bed. No common scheme or headwork has been undertaken.

In the summer of 1935, planters discovered that the water-level in the river-sands was falling. It was thought that there might not be sufficient water to supply the irrigation needs of the increased settlement during a dry year.

This fear resulted in an investigation of the river resources over a length of 3½ miles, commencing at the road bridge across the Gascoyne, which is about 10 miles from

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the outlet into the sea. The photographs, Figs. 2 and 3, at the Gascoyne River Bridge illustrate the sandy river-bed and also show the height necessary to allow floods to pass beneath. Since the bridge was built about eight years ago, flood-waters have risen to the height of the girders. See Fig. 4.

Borings and dippings demonstrated that the depth of water-carrying sand in the river varied from 10 to 20 feet. It was proved that the water actually flowed continuously through the river-bed sands towards the sea; the hydraulic gradient was about 1 in 2,000.

In the length of the river investigated ( $3\frac{1}{2}$  miles) there were 192 million cubic feet of sand, of which 99 million cubic feet were water-carrying. The voids in the sand were 40%. By experiment, we found that 30% of the water in the voids could be drawn off. This showed that, at the time of the survey, the river sands over the length surveyed held 246 million gallons of water, 144 million gallons of which could be pumped out easily.

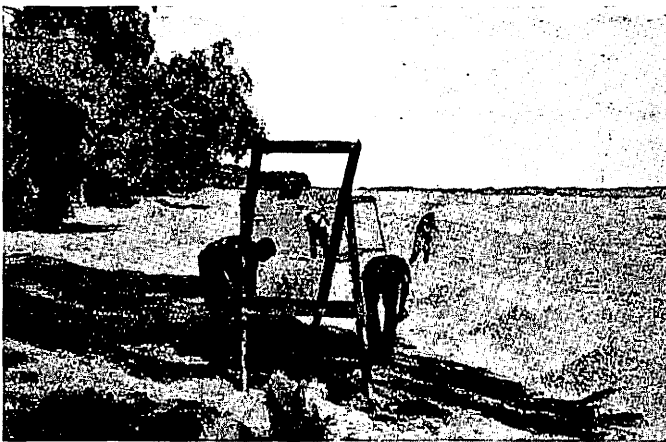


Fig. 2.—Gascoyne River Bed, Carnarvon.

By gauging all the pumping plants along the river, we found that  $7\frac{1}{2}$  million gallons of water were pumped out each week. Although  $7\frac{1}{2}$  million gallons were drawn off each week, the water level in the river only fell on the average of  $1\frac{1}{2}$  in. per week. This fall represented a loss of only approximately 2 million gallons per week. From this it became evident that the river-bed sands were replenished by approximately  $5\frac{1}{2}$  million gallons of water every week from other sources. The replenishment probably comes from:—

- (1) Seepage back from actual water used in irrigation;
- (2) The levelling-up of the water-table from the water-carrying sands beneath the river-banks; and
- (3) From the general flow through the sands in the river-bed.

As already stated, the hydraulic grade line along the river proved that the water flows continuously through the sands into the sea. A considerable quantity of water must be lost in this way. This loss into the sea might be reduced by sheeting across the river-bed, but considerable and costly investigation would be necessary to see if this were worth while, and what it would actually cost. There must also be a loss of water due to capillary action drawing the water to the surface where it evaporates.

The Gascoyne River, in common with all the other northern rivers, runs overground only for a short period after heavy rains. The Gascoyne seldom fails to run. However, last year being a drought year, it did not flow. In

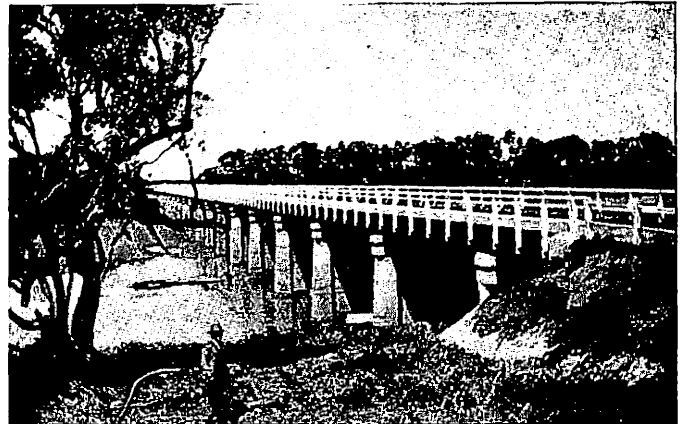


Fig. 3.—Gascoyne River Bridge.

spite of this, the stored water and the seepage down the river-bed sands made it possible to keep the plantations in production, although additional plantings in most instances were postponed.

The water-level in the river fell at the rate of  $1\frac{1}{2}$  in. per week most consistently throughout the whole drought period of nearly two years.

Investigations led us to believe that when the water-level fell 10 ft. in the river-sands, the underground water would cease to flow, then only the deeper sand-pools would remain in reserve. In a number of places, such pools had a further depth of 10 ft.

The water-level actually fell within 9 in. of this danger mark. A chart was anxiously checked off week by week.

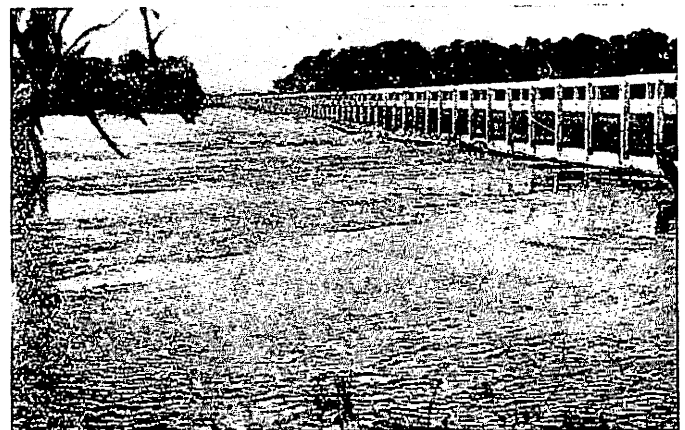


Fig. 4.—Gascoyne River in Flood, flowing under Bridge.

It so happened that as I was writing this very paragraph, a telegram arrived, which read "The Gascoyne came down small river through the north mouth to-day."

Records, as far as we have them, show that the river does not miss coming down for two years in succession. Thus,

the day of further investigation to ascertain if the flow into the sea can be prevented, may reasonably well be postponed for some time longer.

The Gascoyne plantations, their irrigation and water-problems have been mentioned in some detail, because there are numerous other rivers and streams in the North and North-West where similar minor irrigation areas might be

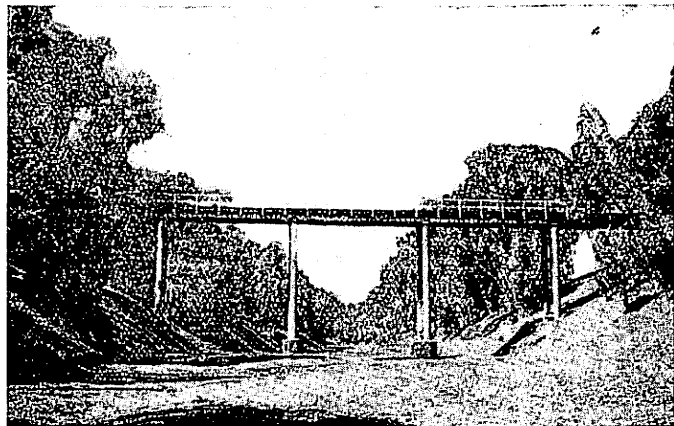


Fig. 5.—Ashburton River Bridge.

established, not for banana-growing but for fodder or other crops. Carnarvon is the port closest to a market, and the supply of Western Australia's requirements of bananas, paw-paws and pineapples should be left to the pioneer settlement at Carnarvon.

The produce from these plantations on the Gascoyne is now worth about £25,000 per annum—very encouraging since the settlement is but newly established.

The photographs of bridges over the Ashburton and Wooramel Rivers, Figs. 5 and 6, and of the low-level crossing over the Fitzroy, 200 miles inland from Derby, Fig. 7, illustrate the sandy nature of the river-beds. These illustrations also demonstrate the fact that something is being accomplished in the way of improved land communications.

The recently-constructed bridges and crossings remove some of the major obstacles to road transport. Although the illustrations show the rivers as sandy wastes, in the wet season

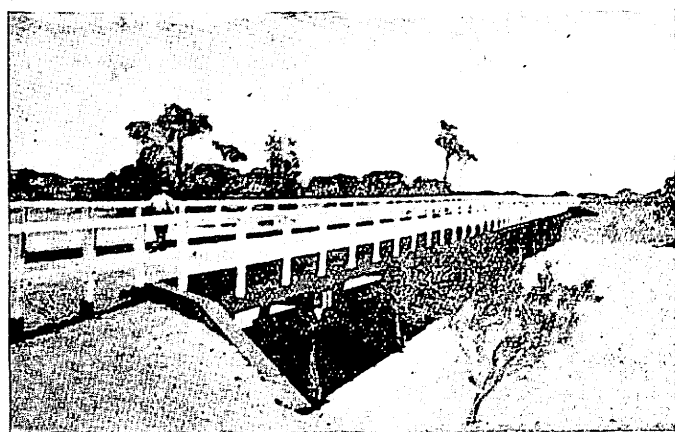


Fig. 6.—Bridge over Wooramel River, on the Carnarvon-Ajana Road.

they are, in fact, raging torrents; in some parts, torrents miles in width.

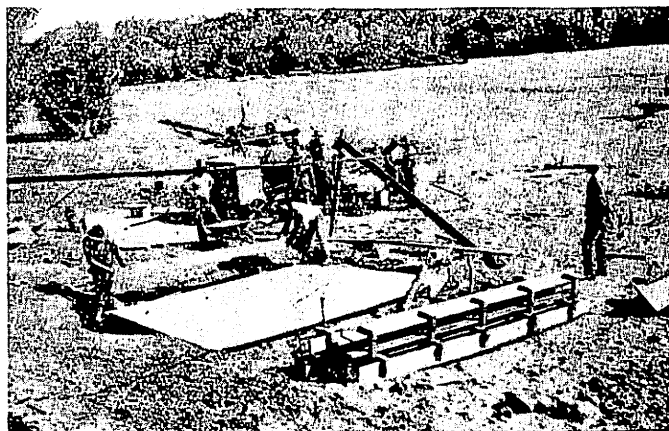


Fig. 7.—Fitzroy River Crossing, under Construction.

Some day the vast quantities of water which run to waste down these sandy river-beds to the sea will be utilised. For the present, the water stored in the river-bed sands can, wherever located, be used at small capital cost, and is thus likely to be exploited years before conservation schemes become practicable.

#### NORTHERN DISABILITIES.

The great disabilities of the North are:—Irregular rainfall, cyclones, white ants, teredo, lack of timber, high tides and heat.

*Irregular Rainfall.*—The primary result of the low and irregular rainfall of the North-West is to make the country a poor pastoral one. With a fair and regular rainfall, this land would support a huge population. Unfortunately, the lack of rain over long periods brings in its train droughts and sand-drifts, making this territory very difficult to popu-

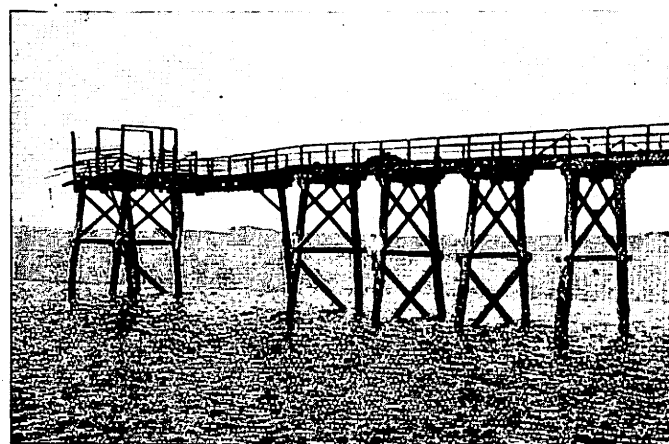


Fig. 8.—The Remains of Samson Jetty, after 1925 Willy Willy.

late. The Kimberleys, in the extreme North, have a better and more regular rainfall. Nevertheless, the dry periods between rains, even in the wet seasons, are such that it is almost impossible to grow profitable crops without irrigation.

*Cyclones.*—The willy-willy of the North, although it usually brings with it the much-desired rain, also frequently leaves behind it a trail of wrecked jetties, luggers and wind-mills. The annual cost of the willy-willy damage would, I think, amount to £50,000. Fig. 8, shows all that remained of Samson Jetty after the willy-willy of 1925. The jetty is now being rebuilt at a cost of £100,000. Fig. 9, shows the Onslow Jetty when rebuilt at a cost of £50,000 after the cyclone of 1935.

*White Ants.*—Those destructive pests, the white ants, make maintenance of buildings very costly. They cause untold damage to public and private property in towns and on stations every year. So long as buildings can be perched up on concrete stumps, with a suitable galvanised iron ant-stop, white ants can be kept out. Should ants get into the buildings, the arsenic account is considerable before they are exterminated, if indeed they ever are. Soft wood is merely an appetiser, whilst hardwoods make little more than a decent meal for the voracious creatures.

*Teredo.*—The marine borer, the teredo, plays havoc with our timber piles, which, if unprotected, are destroyed in a few years. At Carnarvon, we protect piles by charring and tarring. Elsewhere in the North, we sheathe piles with muntz metal. Our latest practice, which is being employed for the first time on Samson Jetty reconstruction, is to wrap Stockholm Felt round the pile before nailing on muntz metal. This protective treatment prolongs the life for probably 10 to 30 years. We have over 3 miles of jetties in the North, with an average of about 4 piles to every 15 feet.

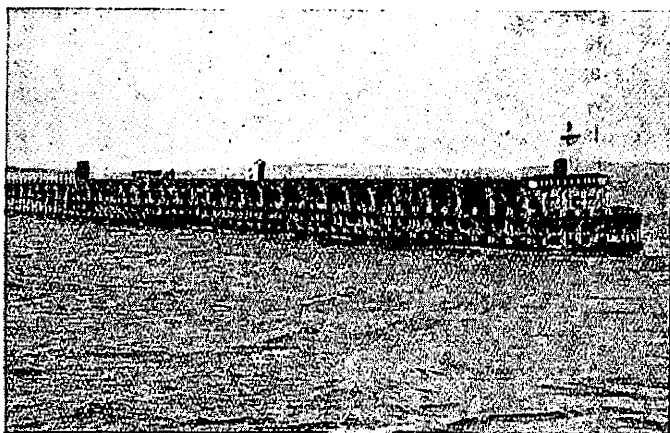


Fig. 9.—Onslow Jetty, Rebuilt after 1935 Willy Willy.

Each pile is from 40 to 60 ft. in length, and costs on the average £70 per pile in position. Recent shipments of muntz sheeting have not been satisfactory, and copper may be used for future pile sheeting.

Our jetty maintenance would be a great deal simpler and cheaper if the teredo did not infest Northern waters. A good jarrah pile, without the costly covering, would then last probably for 50 or more years. The piles in Broome Jetty, which are sheathed in muntz metal and dry out at low tides, are already 40 years old. This fall of tide at Broome makes it easy to patch the metal coating when it is damaged.

*High Tides.*—The high tides, which run up to 34 feet at Derby, make berthing facilities for coastal and other steamers trading along the North-West coast extremely

costly. For instance, at Wyndham we cater for meat-ships drawing 30 feet of water, at all states of the tide. The tidal range is 24 feet. This means that the jetty must be at least 64 feet out of the ground, thus creating a very formidable target for wind and wave pressure.

There are many inlets on the North coast which should prove suitable for conservation of the energy force of the tides, and where at some future date part of this wasted power could be commercialised.

*Lack of Timber.*—As is well known, the North and North-West of Western Australia is a huge territory, yet it boasts no timber fit for milling. This means increased cost in almost every avenue of development on account of freight charges.

*Heat.*—The country, as far as climate is concerned, is a tropical one. The usual tropical disadvantages exist, but not the usual advantages. Even tropical fruits cannot be grown without irrigation. There is malaria on some of the northern rivers, and dengue fever throughout the North and North-West.

Our aborigines are very indifferent workers, except with stock.

Thus the disabilities of the country make it unattractive to our own people for permanent home-making. This results in a more or less fugitive population, for the most part connected in some way with the pastoral industry.

My own opinion is that the North and North-West, except for some patches of irrigation, will remain a pastoral country for a hundred years to come. Even the irrigation patches will be primarily for pastoral purposes, such as stock-fattening or maintenance of stock during years of drought.

#### PROVISION FOR PASTORAL PURSUITS.

As the North-West is likely to remain a pastoral country, aids that are likely to increase the carrying capacity of the country over the years, and reduce the production costs, should be our first consideration. The more important of these might be set down as:—

- (1) Maintenance of supply of edible shrubs (commonly known as top-feed) and possible replacement of non-edible shrubs with edible ones;
- (2) Utilisation of waters available for irrigation for fodder growing;
- (3) Improved land communications—roads, road-trains and railways;
- (4) Improved stock routes; and
- (5) Prevention of soil erosion.

#### MAINTENANCE OF TOP FEED.

Station management in the sheep country has effected numerous improvements to increase the annual dividend. Good shearing-sheds have been provided. Stations have been subdivided into paddocks of from 10 to 40 thousand acres. Stock-watering facilities have been provided—wells, wind-mills and troughing in each paddock. Where shallow water has not been obtainable, boring for artesian water has been tried, in many areas successfully. Probably still smaller paddocks and still more watering-places in each paddock will ultimately further improve dividends.

But pastoralists, whilst making improvements with the expectation of early returns, are not doing much to safeguard the future carrying capacity of the country. Little or no emergency provision for stockholding during droughts is

made. Occasionally, a thoughtful squatter keeps in reserve a few paddocks, though as far as I can learn, this practice is not very general. This temporary reservation of paddocks, however, is not sufficient.

Each drought leaves the sheep-country in a worse condition to stand the next one. Sheep-feed consists of native grasses, herbage and top-feed (edible shrubs).

In good seasons the grass and herbage are abundant and the top-feed is little eaten, but in a bad year everything edible vanishes. In prolonged drought there is no grass. Stock exist by means of top-feed, which is eaten down so that a proportion of it never recovers. The young edible shrubs are naturally completely exterminated. If you travel through the North-West sheep-country during a drought, your chief memory will be of a desolate land, consisting of moving sand and dry sticks.

With good rains, the whole landscape grows green and luxuriant once more, almost as if by magic. Grass and herbage are primarily responsible for this metamorphosis, although such top-feed shrubs as survive, again grow vigorously. Yet each drought results in the country being less capable of resisting another.

Thus the usefulness of the country is gradually being impaired. Remedial measures are becoming urgently necessary. The agriculturalist, pastoralist and engineer together should determine what steps are necessary to bring about better and safer conditions. My own opinion is that, if the sheep-carrying capacity of the North-West areas, excluding the Kimberleys, is to be maintained, some steps to ensure regeneration of suitable top-feed over large areas must be taken in hand. The matter is urgent and the necessary inquiry should be put in hand forthwith. It might here be mentioned that a shrub called salt-bush is an excellent sheep-feed. Salt-bush is fast disappearing from our stations. I recently made the following abstract from some agricultural publication:—

"Sowing Salt-bush.—Mr. D. H. Wittenhall, of Jerilderie, N.S.W., sowed salt-bush seed with a wheat drill in May, 1936. By the end of the year, the salt-bush was 18in. in height. The germination was good. The N.S.W. Agricultural Department is making further experiments."

I have quoted this extract because it gives food for thought.

#### LAND COMMUNICATIONS.

The maintenance of 10,000 miles of roads or tracks which serve the needs of stations of the North and North-West is controlled by 14 Local Authorities. These Boards levy rates on station property, and with such funds, keep the avenues of communication open.

The Road Boards' funds are comparatively small. It is not possible for the Boards to do more than clear and open up tracks and to make good the annual wet season damage.

Fortunately, there are Main Roads funds. Already a number of the chief obstacles to traffic have been removed by works financed from such funds. Illustrations of the bridges recently built and of some of the principal low-level crossings have already been exhibited. Hundreds of river, creek and stream crossings have been improved. Crossings are constructed of stone, concrete or link-mesh netting as seems best. In some instances, even spinifex is used.

The constant appeal is for all-weather roads. But to keep the roads through the Kimberleys trafficable during the wet season will be an expensive matter. The day when it

will be possible to travel comfortably from Carnarvon to Roebourne during the rains is still a long way off. To provide all-weather roads in the North, it will be necessary to spend millions of pounds.

Even so, it is a pleasing fact that each year road transport from Geraldton northwards is being improved, and during the last 10 years, such improvement has been very considerable.

#### ROAD-TRAINS.

At present there is no organised transport from the ports to inland stations. Some stations provide their own transport, whilst others call in the services of local truck owners, who cart stores out to stations, and wool back to port, at rates ranging from 7d. to 1s. per ton-mile.

Some day the question of road-trains up the principal river-basins will be considered. Horse-drawn transport has disappeared from the main roads, whilst soon the once ubiquitous donkey and camel-team will have become things of the past also.

#### RAILWAYS.

There is only one railway in the North-West—from Port Hedland to Marble Bar, a distance of 114 miles. Already a large proportion of the wool that could be transported over this line reaches the port by motor-truck.

The operations of this line demonstrate that a railway is not of much economic benefit in sheep country. Fortunately for the Marble Bar line, the Pilbarra district through which it runs has gold and other metals, which prevent the railway from being entirely a "white elephant."

The one railway that might possibly prove a useful factor in Northern development, would run from Wyndham through the Ord River Valley.

#### IMPROVED STOCK ROUTES.

At present, wells with watering facilities are provided throughout the North-West so that sheep can be travelled to port of shipment. These wells are maintained at Government expense. These suffice reasonably well for the shifting of stock to port in seasons which are uniformly good. Unfortunately, a feature of the North-West rain is the patchy way in which it falls. Thus, an inland station might have excellent rain, resulting in good feed and fat stock, whilst the neighbouring station may be dry and feedless to such an extent that the owner of the fat stock would not be able to market his surplus sheep because he could not travel them through feedless country. To provide against this, the stock-route of the future will probably be a motor track with holding paddocks and water supplies every hundred miles instead of only a well every ten miles as at present.

#### IRRIGATION WATER.

The irrigation of the Gascoyne River plantations has already been described. What has been accomplished there can surely be done elsewhere. At present, during droughts, fodder is brought from the south and transported by ships and trucks to the stations, where it is fed to rams, selected ewes and horses—a costly method.

The question of whether fodder can be grown economically on the stations or in each district is one for mutual investigation by agriculturalists, pastoralists and engineers.

## SAND DRIFTS.

As I have said, droughts result in vegetation being destroyed. But this is only a beginning of future trouble. The destruction of vegetation is followed by the curse of blown sands. At the end of a drought, the whole countryside seems to be shifting, and numerous sand-ridges are formed.

When travelling to Port Hedland recently by aeroplane, we flew through a hundred miles of dust storm. The air was red with dust for a thousand or more feet from the ground. It is therefore obvious that something must be done to keep the earth from shifting.

The only solution would appear to be the keeping of stock away from large areas of country in order to permit the regrowth of vegetation.

## CATTLE-COUNTRY.

Up to now I have dealt particularly with the sheep country, but the Kimberleys or cattle-country of the North must not be overlooked. Large areas of this cattle-country are now thought to be suitable for sheep.

Last year the largest clip in the State from a single station was produced on a Kimberley sheep-run, and shipped through the port of Derby.

Even so, the immediate necessity in the Kimberleys is more and better cattle, and the improvement of facilities so that cattle can reach their markets in the best possible condition at the lowest possible cost.

Chilled beef can now be sent from Wyndham to London. As Wyndham is the site of our only meatworks, we should first concentrate on improving conditions there.

If meatworks are to be established for West Kimberley cattle, a new port with a water-supply will be required. Derby is only a tidal port and coastal ships have to rest on the sea-bottom, at the jetty. This would be quite impossible with large meat ships.

Better cattle can be bred by the provision of more paddocks and waters, and by the introduction of stud stock into the herds. At the present time the only fence on the average cattle-station is around the horse paddock, whilst the only waters used are natural pools in various streams. Better stock routes and land communications, with perhaps a railway up the Ord, would also improve the business of cattle-growing.

The building of a railway for even a 100 miles in the valley of the Ord River, would probably cost £750,000.

## COST OF DEVELOPMENT.

The Government of Western Australia has already spent quite a large sum opening up the northern areas of this State to pastoralists. Distributing bases have been established at Shark Bay, Wooramel, Carnarvon, Maud's Landing, Onslow, Samson, Balla, Port Hedland, Broome, Derby and Wyndham; jetties, goods-sheds, tramways, rolling stock, etc., have been provided at each of these centres. These ports with their concomitant expenses, buildings, stock routes, meatworks, etc., have cost the State, in round figures, about 3 million pounds.

North of the 26th parallel of latitude, which line almost passes through the pearling town of Denham on Peron Peninsula in Shark Bay, there are 126 million acres under pastoral lease. On these leases there are :—

Sheep ... ..	3,540,000 approx.
Cattle ... ..	570,000 „
Horses ... ..	21,500 „

The annual exports from the area under discussion are as follow :—

Wool, 88,360 bales ... ..	£1,580,000
Sheep, 110,000 ... ..	72,500
Cattle, 52,000 ... ..	268,500
Marsupial Skins ... ..	100,000
Pearls and Pearl Shell ... ..	81,000
Gold ... ..	76,000
Bananas ... ..	18,000
Asbestos ... ..	3,000
Tantalite ... ..	3,000
Total ... ..	£2,202,000

Thus the total annual value of exports is approximately £2,200,000.

As I have said, the State has spent about 3 million pounds. Added to this, the pastoralists have themselves invested 11 million pounds. That makes 14 million pounds spent in bringing this territory to its present state of production. You will see that this investment yields nearly 15% gross income on capital outlay.

For these figures, I am indebted to Mr. Wilson, the Deputy Government Statistician. You might remember he contributed very ably to the debate we had in 1936 on *The Growth of Population in Western Australia*.

The present population in Western Australia north of the 26th parallel is 8,650 whites and, approximately, 15,000 aborigines. It has remained practically stationary for a number of years. In other words, the country is not progressing.

The profitable growing of bananas at Carnarvon by irrigation and the increased yield of wool per sheep are the only bright spots in a not very encouraging outlook for the future of the North-West.

As statisticians and economists forecast that Western Australia's white population from now on is destined to increase very slowly, it seems unlikely that the population of the North-West will increase to any marked extent.

As such opinions must be respected, it seems that grandiose schemes of northern development are not at present worth consideration.

## THE IMMEDIATE PROBLEM.

The immediate problem for the North would thus appear to be :—How can we increase our pastoral production so as to return a surer and bigger dividend and at the same time safeguard the industry for the pastoralist?

In the preceding pages, the various possibilities that suggested themselves to me as having a direct bearing on the solution of this puzzle, have been discussed.

Now I propose to give a resumé of those steps which I imagine should be taken in order to determine a solution :—

(1) The establishment of an authority for deciding on the machinery necessary to regenerate and preserve the top-feed in sheep areas, and to prevent the ever-increasing soil erosion;

(2) An investigation to ascertain the available sources of irrigation-water, and experiments to prove how best such water can be utilised;

(3) The consideration of the establishment of a market for West Kimberley cattle, chilling, or the securing of an overseas market for cattle on the hoof;

(4) An inquiry to determine the economic possibilities of the introduction of road-trains, say, through Fitzroy, Ashburton and Gascoyne River Basins;

(5) The appointment of a committee to inquire into the economic possibility of a railway through the Ord Valley, for transportation of cattle to the meatworks;



(6) An inquiry to ascertain how cattle herds in the Kimberleys can be improved in quality and how the carrying capacity of country can be increased; and

(7) An inquiry to decide if badly paying cattle-stations suitable for sheep should be converted into the more profitable sheep runs.

I conjecture that the results of such inquiry and investigation would prove that :—

- (1) It is essential on each sheep-station to rest certain areas for prescribed periods, so that top-feed can be regenerated, thus minimising losses during droughts and preventing sand drift. Probably 15% of each area leased should be closed to stock for 3-year periods;
- (2) That suitable underground water is obtainable from many stream-beds in quantities sufficient for irrigation, and that irrigation for reserve fodder crops can be successfully and economically undertaken in many parts;
- (3) That a chilling-works for West Kimberley cattle is required;
- (4) That a road-train is warranted up the basin of the Fitzroy River and possibly up that of the Gascoyne also;
- (5) That in the future the building of a railway up the Ord River Valley is likely to be justified;
- (6) That Kimberley cattle herds can be improved by credit being made available for introduction of stud stock, provision of more paddocks and more waters. That expenditure of the necessary capital would be justified by results;
- (7) That large areas of country now growing cattle in the Kimberleys with little or no profit can be converted into paying sheep-stations.

#### CONCLUSIONS.

Unless some such programme for improvement is followed in the North-West in the future, I venture the opinion that pastoral production will decrease and that eventually the soil will become so loose and drifting over large areas that they will have to be abandoned.

On the other hand, it is my firm conviction that the sheep industry in the North-West can be safeguarded for all times, that drought losses can be minimised, and that the pastoral population and production can be at least doubled in the next 20 years, provided the necessary investigations and experiments are put in hand and followed up by such action as may prove necessary.

Ten years ago, I stated that any marked permanent improvement in production and population in the North would come from irrigation—I am still of the same opinion.

## Annual Engineering Conference.

#### ALTERATION IN ARRANGEMENTS.

The Annual Engineering Conference of The Institution has become one of the major activities. It is recognised throughout all Divisions as an opportunity for the promotion of technical knowledge, the interchange of opinions and ideas, and the development of an understanding which must benefit the individuals constituting the engineering profession of the Commonwealth.

It has been the practice in the past that the Conference be held not earlier than the middle of February and not later than the end of April in each year. On occasion there has been some criticism of this arrangement when extreme summer temperatures have, to some extent, limited the capacity for complete enjoyment of the round of technical and social activities.

The Council of The Institution has now decided that the Conference shall be held in the latter half of the year and, for this purpose, the month of November is named, but there is this qualification that the Council may vary this date, say by a month or two if, in its opinion, there are special circumstances in any particular year which warrant a change in the prescribed date.

An Extraordinary General Meeting of The Institution will be held during the progress of the Annual Conference. The business of this meeting will include :—

- (i) Award of Prizes.
- (ii) Presentation of the Presidential Address.
- (iii) Commentary on the work completed and projected during the year.
- (iv) Introduction of President-Elect.
- (v) Any other business as thought fit.

A meeting of the Council of The Institution will also be held during the progress of the Conference.

The Annual General Meeting of The Institution will still be held early in the year—during the first half of the month of March—alternatively in Sydney or Melbourne, or elsewhere as determined by the Council. The business of this Meeting will include :—

- (i) Declaration of results of ballots for election of Councillors and Associate Councillors.
- (ii) Presentation of Annual Report and Balance Sheet, already published in THE JOURNAL.
- (iii) Installation of President-Elect (with opportunity for retiring President to comment on any special developments since the presentation of his Address).
- (iv) Appointment of Auditors for the year.
- (v) Some item of general interest as a foil to the more formal business.

As at present, two meetings of the Council will be held at about the time of the General Meeting—one, the last meeting of the retiring Council, and the other, the first meeting of the new Council.

No objection can be seen to the dissociation of the Presidential Address from the Annual General Meeting of The Institution. It is felt rather, that it will be appropriate for the Presidential Address to be presented during the progress of the Annual Conference, when an attendance representative of the several Divisions of The Institution is likely to be secured, and when also more public notice, due to the holding of the Conference, will be directed towards The Institution than would normally be the case. There will, of course, be the opportunity for the President, at the Annual General Meeting some four months later, to comment on any special developments since the presentation of his Address.

An aspect of considerable importance is that the holding of one Council meeting only during the period of the Conference will enable the members of the Council to participate more actively in the proceedings of the Conference than has been the case under the arrangements to date. The absence of so many of the senior engineers from technical sessions, because of the demands of the Council meetings, has been noticeable on many occasions in the past, and it is felt that under the new arrangement the opportunity to participate in the discussion of papers, and in visits of inspection, will be appreciated.

The Engineering Conference of 1938, to be held in Sydney during the week commencing 28th March, will be the last under the original arrangement. The Canberra Engineering Conference, to be held also during 1938, will be the first under the new procedure, but the exact date of this Conference has not yet been fixed, other than that it shall be in the latter half of the year.